

4. CONCEPTUAL COST ESTIMATE

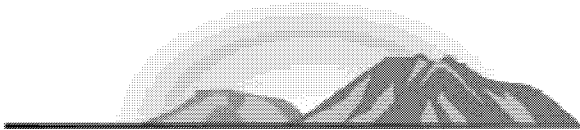
During conceptual design, the project team developed a preliminary baseline cost estimate range. Using the project work breakdown structure (WBS), the activities, materials, and other sources of expenditure were estimated to arrive at a total project cost. The project team used (a) an estimating program to develop and format the estimate to a level of detail consistent with the preliminary baseline information; (b) a combination of several estimating techniques, as outlined in the *INEEL Cost Estimating Guide* (DOE/ID-10473), to meet the estimating requirements of DOE Order 413.3, “Program and Project Management for the Acquisition of Capital Assets”; and (c) published construction estimating databases, vendors and material suppliers, subject matter experts, and Site-specific historical information to determine pricing and productivity rates for estimate detail items. In addition, the validity of the estimated costs for project management, Site support, project design, procurement, construction management, construction, start up and testing, and DD&D was evaluated during department and project team reviews of the estimate. Cost estimating assumptions are presented in Appendix A. Also, cost escalation factors to the estimate levels were applied according to the *INEEL Cost Estimating Guide*, consistent with the baseline project schedule. The project baseline cost estimate range for CD is \$78–82 million. Table 4-1 summarizes the preliminary baseline cost estimate.

- The project baseline cost estimate range for CD is \$78-82 million, based on proven cost estimating processes

Contingency was included in the cost estimating process to cover cost/schedule risks. Potential risks to the Project were identified and evaluated for activities at the third or fourth level of the WBS. Through a consensus process, an upper and lower bound was determined as a percent change from the original estimated cost. This data was input into a commercially available software package to calculate and apply the appropriate contingency to the estimate elements using a Monte Carlo simulation technique and triangular distribution.

Table 4-1. Summary of estimated costs for the conceptual design.

WBS	Title	Cost with Contingency at 85% Confidence	Cost with Contingency at 65% Confidence
1.0	ESH&Q	\$6.6M	\$6.30M
2.0	Design	\$7.5M	\$7.3M
3.0	Procurement	\$9.8M	\$9.2M
4.0	Construction	\$5.6M	\$5.4M
5.0	DD&D	\$5.7M	\$5.0M
6.0	Startup and Testing	\$4.6M	\$4.3M
7.0	Operations	\$27.6M	\$25.7M
8.0	Maintenance	\$3.9M	\$3.8M
9.0	Project Admin	\$9.4M	\$9.3M
NA	BBWI PF and G&A	\$1.2M	\$1.2M
Total		\$81.9M	\$77.5M



5. PROJECT SCHEDULE

The Glovebox Excavator Method Project consists of three primary phases:

- Site development—covers design, bid and award, and construction activities relative to access improvements, earthwork/pad, electrical service, and firewater installation.
- Structures—covers design, procurement, bid and award, and construction of the FFS, the RCS, and the WES.
- Facility completion—covers final design, bid and award, and construction of the HVAC, electrical distribution, facility fire protection, and instrumentation and controls; and installation of the gloveboxes and excavator.

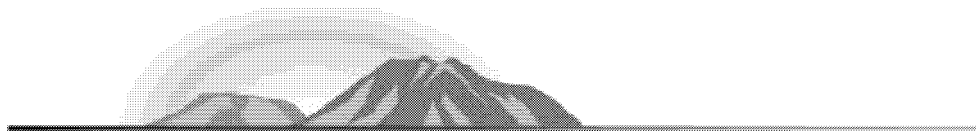
The project occurs in three phases:

1. Site Development—encompasses civil preparations and utility connections.
2. Structures—encompasses preparing for and constructing project structures.
3. Facility Completion—encompasses construction and installation of personnel protective and operations equipment.

Depending upon the final acquisition strategy for the project, some major items such as the WES, RCS, and excavator will be procured with performance specifications, and government furnished to the facility completion subcontractor. The gloveboxes will be purchased under a procurement specification from a local fabrication shop, and furnished to the facility completion subcontractor for installation.

The master schedule for the project will be prepared based on the above strategy, with consideration given to fiscal-funding limitations, weather, and the construction season (time of year). Project milestones are included based on BBWI's understanding of DOE preliminary agreements with EPA and IDEQ. The summary schedule is given in Appendix E.

The schedule for notifying the Agencies of obtaining Critical Decision (CD)-2/3 is currently August 30, 2002. However, in order to meet the project objective of having the facilities enclosed from the weather, CDs must be obtained in phases. Partial CD-3a authorization, must occur once the site development design is completed (anticipated in the early spring of 2002) which constitutes DOE-ID's approval to initiate construction of the same. Partial CD-3b authorization, which is expected to occur in the second quarter of 2002, will approve procurement of the RCS, WES and construction of the FFS. CD-2/3 authorization, which must occur no later than August 2002, will authorize the remainder of construction activities.



6. PROJECT ASSESSMENTS

6.1 Safety Classification and Category

6.1.1 Hazard Analysis and Classification

A Category 2 hazard classification has been determined for glovebox excavator project operations. This classification was determined by comparing threshold quantities for radionuclides given in DOE-STD-1027-92 to bounding inventories of materials that may be encountered during glovebox excavator project operations as discussed in Section 3 of the *Preliminary Documented Safety Analysis for the Operable Unit 7-10 Glovebox Excavator Method*, based on the potential for a nuclear criticality.

The conceptual design:

- Mitigates identified hazards
- Ensures worker and public safety
- Alleviates the operator burden of administrative controls

Significant hazards associated with the glovebox excavator project operations are:

1. Operational: low voltages, over-pressurized containers, mechanical and moving equipment, excavations, construction, material handling, combustible materials, flammable materials, pyrophoric metals, explosive materials, nonradioactive hazardous materials, ionizing radiation, radioactive materials, fissile materials, pit subsidence, and internal flooding
2. External: aircraft impact, range fires, and loss of electrical power;
3. Natural Phenomena: seismic events, flooding, high winds, lightning, snow loads, and volcanic activity.

Table E-2 of the Preliminary Documented Safety Analysis (PDSA) gives a summary of the main preventive and mitigative features.

6.1.2 Safety Category

Based on criteria established by DOE-ID (DOE-ID Order 420.D) and the hazard and accident analysis results found in Section 3 of the PDSA, no safety-class systems, structures, or components (SSCs) have been identified for glovebox excavator project operations. The RCS, the PGS fire protection system, the criticality alarm system (CAS), and container semipermeable gaskets or filtered container vents are designated safety-significant SSCs. The PDSA identifies design and functional requirements for these systems that should be considered in the design process. These requirements are summarized in PDSA, Table E-3. The applicable facility design requirements of DOE Order 420.1, "Facility Safety," and DOE-ID Order 420.D, "Requirements and Guidance for Safety Analysis," will be followed.

6.2 Radiological Safety

Radiological safety factors that must be considered in design are:

1. Identifying specific radiological hazards posed by the project
2. Identifying required mitigating features for worker protection

-
3. Identifying required mitigating features for co-located workers, the public, and the environment
 4. Verifying environmental, safety, and health mitigating features of the design.

Specific radiological hazards posed by the project must be identified before the project's alpha, gamma, or neutron hazards can be addressed. Expected radiation levels and allowable operating levels will be discussed, and the trigger levels where PPE is needed will be defined. The conditions under which remote operations are necessary will be defined.

In order to identify required mitigating features for worker protection, performance requirements (leak rates) for HVAC operation and safe shut-down must be addressed. In addition, time, distance, and shielding requirements for work in the RCS and PGS must be identified, as well as conditions that determine the extent of required personal protective equipment.

To identify required mitigating features for co-located workers, the public, and the environment, HVAC filtering system performance requirements must be addressed and any time, distance, and shielding requirements identified.

Environmental, safety, and health mitigating design features must be verified. Examples include identifying personnel and environmental monitoring requirements, such as HVAC, worker air monitoring, and personnel survey equipment. Required radiation monitors and the level of exhaust monitoring and sampling required to meet environmental requirements must also be identified.

6.3 Industrial Safety

The project will use the five core functions and guiding principles of the Integrated Safety Management System (ISMS).

Industrial safety factors that must be considered in design are:

1. Identifying the specific chemical hazards posed by the project
2. Identifying the specific industrial hazards posed by the project
3. Identifying required mitigating features for worker protection
4. Identifying required mitigating features for co-located workers, the public, and the environment
5. Verifying environmental, safety, and health mitigating features of the design.

Identifying the specific chemical hazards posed by the project includes addressing the source and potential contamination levels of airborne chemical hazards, such as volatile organic compounds, heavy metals, dusts, and diesel exhaust fumes. Also, the operating limits or trigger points for PPE for manned entry or confinement operations must be defined. During design, when and under what conditions remote operations must occur during the project will be discussed.

Identifying the specific industrial hazards posed by the project includes addressing the source of expected industrial hazards. Examples of expected industrial hazard sources include: hazardous material handling and storage; moving machinery; high-temperature and -pressure systems, including compressed gas storage and handling; walking/working surface design, including elevated surfaces; equipment access

and heavy equipment operation; excavation; hoisting and rigging; electrical equipment; welding/cutting operations; heat/cold stresses; and noise exposure.

Identifying required mitigating features for worker protection includes addressing performance requirements, such as air changes per hour, for HVAC operation and passive, safe shut-down. In addition, industrial hazards that could exist at the project site, such as sizing activities, remote hoists, other lifting, machine guarding, material selection, must be identified. Material compatibility with chemical contaminants must also be ensured (e.g., for structural components, sealing materials, gloves, and other materials). Emergency equipment, such as eyewash/shower facilities, necessary for emergency response must be defined. Applicable conditions for the extent of required personal protective equipment must be identified.

Identifying required mitigating features for co-located workers, public, and the environment includes addressing HVAC filtering system and containment systems performance requirements to prevent hazardous emissions to the environment. Any time, distance, and shielding requirements must be identified and isolation/location features defined to prevent co-located worker or public access.

Verifying environmental, safety, and health mitigating features of the design includes personnel and environmental monitoring and sampling requirements to verify proper HVAC operation. It also includes worker air monitoring and personnel survey equipment. Industrial hygiene/health levels for volatile organic compounds, carbon monoxide, and mercury fumes, and heavy metal/asbestos/dust emissions will be considered. Noise levels will be addressed, and the level of exhaust monitoring and sampling required to meet environmental and OSHA requirements will be identified.

6.4 Safeguards and Security

Safeguards and security interests at the glovebox excavator project will be protected to preclude or minimize unauthorized access, unauthorized disclosure, loss, destruction, modifications, theft, compromise, or misuse.

Protective Force personnel will control access to the glovebox excavator project during construction and operations. A guardpost will be established on the north perimeter of the RWMC area. A construction-type, two-strand fence will be constructed to define the boundaries between the glovebox excavator project area and the surrounding LMAES and RWMC areas. Gates and buildings will be secured with security locks to preclude unauthorized access to the area or operations. Badges or temporary passes will be required for access to the area. The project manager or his designee will coordinate with Personnel Security and Physical Security Systems to ensure all construction and operations employees are badged appropriately.

A Physical Security Plan for the project outlines the physical protection requirements, access controls, and information protection requirements. A contingency plan addresses immediate security actions and requirements if classified material is excavated. The project manager or his designated security liaison will coordinate with the physical security officer to develop these plans and ensure the requirements therein are implemented.

The glovebox excavator project manager will appoint a nuclear material custodian (NMC) with responsibility to receive, account for, and store accountable nuclear materials. The NMC will coordinate with INEEL Safeguards to establish a material balance area (MBA) in which to store the nuclear material

necessary for the project. Safeguards will seek approval for the MBA from DOE-ID. The MBA will be located in a locked area.

Some of the excavated material has the potential to be classified. The INEEL Classification Office participates in design reviews for the construction and operation of the glovebox excavator project to ensure the design doesn't present an opportunity for compromise of classified material. The Classification Office will periodically witness excavation to determine the classification level of excavated materials. If classified material is excavated, operations will be suspended and additional physical protection measures will be implemented immediately. The Classification Office and Physical Security will initiate a review of the project and possibly a damage assessment. A determination on how to proceed with the project will be made after these activities are completed.

6.5 Emergency Preparedness

The glovebox excavator project hazards assessment is the basis for designation of safety SSCs. The glovebox excavator project emergency plan describes procedures involved in coping with operational emergencies in accordance with MCP-2398, "Developing and Maintaining Emergency Preparedness Hazards Assessments." Design rigor must meet the requirements of safety SSCs referenced in Section 6.1.2 of this Conceptual Design Report and address contents of the Project Emergency Plan, as applicable. Examples of key safety considerations include performance requirements for the HVAC filtration and containment system to prevent contaminant emissions, isolation/location features to prevent co-located worker or public access, and backup design systems to handle fire water or power losses.

6.6 Risk Assessment

Risk management is a structured process to manage potential risk impact on a project. A risk management plan helps key decision makers focus on areas of concern and make more informed decisions. The risk management process includes six key risk management elements that are the basis for a risk management plan. The process is an interactive cycle, designed to remain current with project events and detail.

General risk-handling strategies for each project risk identified are located in Appendix F of PLN-1024, "Risk Management Plan for the OU 7-10 Glovebox Excavator Method Project". While the strategies are general in nature, they do identify the highest areas of concern through estimations of risk factors. The highest risks to the project, which may result in additional time, schedule, and or cost, are meeting safety requirements and executing concurrent design/construction activities. The plan reinforces the fact that strict attention to safety and quality assurance details is paramount.

Design enters into a variety of risk handling strategies to mitigate safety and schedule risks. For example:

- Incorporating fire suppression and mitigation systems sufficiently into the project
- Coordinating closely with the safety professionals to ensure safety function SSCs are scoped and designed properly
- Adding "stops" to the range of the excavator to reduce the likelihood of a breach by hitting the confinement structure yet allowing sufficient degrees of freedom or movement to excavate the waste

-
- Coordinating closely with procurement and construction during concurrent design to identify and manage their interfaces and be consistent in work scope and material specification.

6.7 Configuration Management

The OU7-10 glovebox excavator project uses configuration management processes, procedures and tools as defined in PLN-996, “Configuration Management Plan for the OU 7-10 Glovebox Excavator Project,” and Section 8.0, “Configuration Management.” Changes to the CDR and associated drawings are configuration controlled in accordance with the PLN-996.

6.8 Quality Assurance

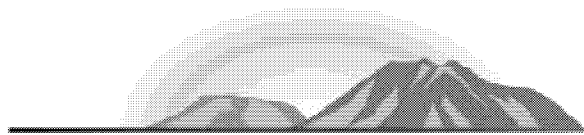
The glovebox excavator project quality activities are based on mandatory company procedures, DOE orders, and standards.

A graded approach based on risk and safety analyses, interfaces between construction and operations, and information from the ‘Nine Block’ process described in MCP-9106, “Management of INEEL Projects,” is used to determine the SSC safety classifications.

The glovebox excavator project contains Safety Significant SSCs, as documented on Form 414.70, “Safety Category List,” which is required by MCP-540, “Documenting the Safety Category of Structures, Systems, and Components.” Designers must ensure a proper level of rigor is used to meet the design requirements for the SSCs listed on Form 414.70.

Quality Assurance guidance can be found in:

- MCP 2811, “Design Control”
- 10 CFR 830 Subpart A, “Quality Assurance Requirements”
- 10 CFR 835, “Occupational Radiation Protection”
- DOE G 414.1-2, “Quality Assurance Management System Guide”
- ID O 414.A, “Quality Assurance”
- ASME NQA-1-1997, “Quality Assurance Requirements for Nuclear Facility Applications”
- INEEL Manual 13A, “Quality and Requirements Management Program Documents.”



7. REFERENCES

MCP references are generic in nature in CD-1. In the execution phase we will only call out MCPs and MCP sections that are applicable to the project.

Abbott, Michael R., 2000, *Operable Unit 7-10 (OU 7-10) Staged Interim Action Project — Stage II Air Emission Evaluation*, INEEL/EXT-98-00848, Rev. 0, Idaho National Engineering Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho, March 20, 2000.

ASME NQA-1-1997, “Quality Assurance Requirements for Nuclear Facility Applications,” American Society of Mechanical Engineers Standard.

10 CFR 830, Subpart A, 2000, *Code of Federal Regulations*, Title 10, “Energy,” Part 830, “Nuclear Safety Management,” Subpart A, “Quality Assurance Requirements,” Office of the Federal Register.

10 CFR 835, 2000, *Code of Federal Regulations*, Title 10, “Energy,” Part 835, “Occupational Radiation Protection,” Office of the Federal Register.

40 CFR 261, 2000, *Code of Federal Regulations*, Title 40, “Protection of Environment,” Part 261, “Identification and Listing of Hazardous Waste,” Office of the Federal Register.

40 CFR 264.316, 2000, *Code of Federal Regulations*, Title 40, “Protection of Environment,” Part 264, “Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities,” Section .316, “Disposal of Small containers of Hazardous Waste in Overpacked Drums (lab packs),” Office of the Federal Register.

49 CFR 171, 2000, *Code of Federal Regulations*, Title 49, “Transportation,” Part 171, “General Information, Regulations, and Definitions,” Office of the Federal Register.

49 CFR 172, 2000, *Code of Federal Regulations*, Title 49, “Transportation,” Part 172, “Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements,” Office of the Federal Register.

49 CFR 173, 2000, *Code of Federal Regulations*, Title 49, “Transportation,” Part 173, “Shippers—General Requirements for Shipments and Packagings,” Office of the Federal Register.

49 CFR 174, 2000, *Code of Federal Regulations*, Title 49, “Transportation,” Part 174, “Carriage By Rail,” Office of the Federal Register.

49 CFR 175, 2000, *Code of Federal Regulations*, Title 49, “Transportation,” Part 175, “Carriage By Aircraft,” Office of the Federal Register.

49 CFR 176, 2000, *Code of Federal Regulations*, Title 49, “Transportation,” Part 176, “Carriage by Vessel,” Office of the Federal Register.

49 CFR 177, 2000, *Code of Federal Regulations*, Title 49, “Transportation,” Part 177, “Carriage by Public Highway,” Office of the Federal Register.

49 CFR 178, 2000, *Code of Federal Regulations*, Title 49, "Transportation," Part 178, "Specifications for Packagings," Office of the Federal Register.

CP-244, 1999, "Chain-of-Custody, Sample Handling, and Packaging for CERCLA Activities," Rev. 3, Environmental Restoration Program, September 3, 1999.

DOE G 414.1-2, 1999, "Quality Assurance Management System Guide for Use with 10 CFR 830.120 and DOE O 414.1," U.S. Department of Energy, June 17, 1999.

DOE O 413.3, 2000, "Program and Project Management for the Acquisition of Capital Assets," U.S. Department of Energy, October 13, 2000.

DOE O 420.1, 2000, "Facility Safety," U.S. Department of Energy, Change 3, November 22, 2000.

DOE/ID, 2001, INEEL Cost Estimating Guide, DOE/ID-10473, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho, September 2001.

DOE-ID O 414.A, 2000, "Quality Assurance," U.S. Department of Energy Idaho Operations Office, May 17, 2000.

DOE-ID O 420.D, 2000, "Requirements and Guidance for Safety Analysis," U.S. Department of Energy Idaho Operations Office, July 17, 2000.

DOE-ID, 1993, Record of Decision: Declaration of Pit 9 at the Radioactive Waste Management Complex Subsurface Disposal Area at the Idaho National Engineering Laboratory, Idaho Falls, Idaho, U.S. Department of Energy, Idaho Operations Office, U.S. Environmental Protection Agency Region 10, and State of Idaho Department of Health and Welfare.

DOE-ID, 1998, *Explanation of Significant Differences for the Pit 9 Interim Action Record of Decision at the Radioactive Waste Management Complex at the Idaho National Engineering and Environmental Laboratory*, U.S. Department of Energy, Idaho Field Office; U.S. Environmental Protection Agency, Region 10; Idaho Department of Health and Welfare.

DOE-ID, 2000a, "Draft Operable Unit 7-10 (OU 7-10) Staged Interim Action Project, Stage II, RD/RA Work Plan Primary Deliverable Submittal," Binder I-A, "Remedial Design/Remedial Action Work Plan for Stage II of the Operable Unit 7-10 (OU 7-10) Staged Interim Action Project," DOE/ID-10767, U.S. Department of Energy, Idaho Operations Office, Idaho Falls, Idaho, June 2000.

DOE-ID, 2000b, *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10 and Inactive Sites*, DOE/ID-10587, Rev. 6, U.S. Department of Energy, Idaho Operations Office, Idaho Falls, Idaho.

EPA Order 5360.1 A2, 2000, "Policy and Program Requirements for the Mandatory Agency-Wide Quality System," U.S. Environmental Protection Agency, May 5, 2000.

EPA, 1994, *Guidance for the Data Quality Objectives Process*, EPA QA/G-4, EPA/600/R-96/055, U.S. Environmental Protection Agency.

Form 414.70, 2001, "Safety Category List," Rev. 4, April 18, 2001.

-
- INEEL, 2001, "OU 7-10 Glovebox Excavator Method Technical and Functional Requirements," INEEL/EXT-1998-00444, TFR-2527, Rev. 2, Draft b, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho, December 2001.
- INEEL, 2001, *Waste Area Group 7 Analysis of OU 7-10 Stage II Modifications*, INEEL/EXT-01-01105, Idaho National Engineering Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho.
- INEEL, 2002, "Preliminary Documented Safety Analysis for the OU 7-10 Glovebox Excavator Method Project (Draft)," INEEL/EXT-01-01474, Rev. B, Idaho National Engineering and Environmental Laboratory, Bechtel BWXT Idaho, LLC, Idaho Falls, Idaho, January 2002.
- LMITCO, 1998, *OU 7-10 RD/RA Contingency Program System Requirements Document*, INEEL/EXT-98-00310, Rev. 0, Idaho National Engineering and Environmental Laboratory, LMITCO Systems Engineering, Lockheed Martin Idaho Technologies Company, Idaho Falls, Idaho.
- MCP 2811, 2001, "Design Control," Rev. 7, Engineering and Research Conduct of Engineering, Configuration Management, Systems Engineering, and Engineering Change Control, June 19, 2001.
- MCP-2398, 2001, "Developing and Maintaining Emergency Preparedness Hazards Assessments," Rev. 2, Emergency Preparedness, March 20, 2001.
- MCP-540, 2001, "Documenting the Safety Category of Structures, Systems, and Components," Rev. 13, Quality, March 30, 2001.
- MCP-9106, 2001, "Management of INEEL Projects," Rev. 3, Project Management, September 30, 2001.
- NFPA 101, 2000, *Life Safety Code*, National Fire Protection Association.
- PLN-996, 2002, "Configuration Management Plan for the OU 7-10 Glovebox Excavator Method Project (Draft)," Rev. 0, January 2002.
- PLN-1024, 2002, "Risk Management Plan for the OU 7-10 Glovebox Excavator Method Project," Rev. B, Environmental Restoration, January 2002.
- Quality Systems, 2001, *Manual 13A - Quality and Requirements Management Program Documents*, Rev. 2, June 1, 2001.
- U.S. Department of Energy Standard DOE-STD-1027-92, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports," Change 1, September 1997, U.S. Department of Energy.

